# 2020 Biennial Energy Storage Review

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Integrated Systems Engineering The Ohio State University

Department of Energy Office of Electricity Energy Storage Peer Review 2019

Albuquerque, New Mexico 24 September, 2019





### **Electricity Advisory Committee**

Charge

#### Providing Advice to the Department On:

- Implementing the Energy Policy Act of 2005
- Executing the Energy Independence and Security Act of 2007
- Modernizing the Nation's Electricity-Delivery infrastructure





Statutory Requirements

- Energy Independence and Security Act of 2007 (EISA)
  - Energy Storage (Technologies) Subcommittee of EAC formed in March 2008 in response to Title VI, Section 641(e)
- Title VI, Section 641(e) has two parts pertaining to this subcommittee
  - Section 641(e)(4): '... every five years [the Energy Storage Technologies Subcommittee], in conjunction with the Secretary, shall develop a five-year plan for... domestic energy storage industry for electric drive vehicles, stationary applications, and electricity transmission and distribution.'
  - Section 641(e)(5): '... the Council shall (A) assess, every two years, the performance of the Department in meeting the goals of the plans developed under paragraph (4); and (B) make specific recommendations to the Secretary on programs or activities that should be established or terminated to meet those goals.'

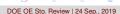




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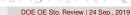




#### Members

- Ramteen Sioshansi (Chair); The Ohio State University
- Lola Infante (Vice Chair); Edison Electric Institute
- John Adams; Electric Reliability Council of Texas
- Christopher Ayers; North Carolina Utilities Commission Public Staff
- Tom Bialek; San Diego Gas & Electric Company
- Laney Brown; Avangrid, Inc.
- Paul Cicio; Industrial Energy Consumers of America
- Armond Cohen; Clean Air Task Force
- Robert Cummings; North American Electric Reliability Corporation
- Ann Delenela; Entergy
- Kimberly Denbow; American Gas Association
- Andrew Fellon; Trane Energy Supply Services
- Flora Flygt; American Transmission Company (retired)





#### Members

- Lisa Grow; Idaho Power Company
- Michael Heyeck; The Grid Group, LLC
- Clay Koplin; Cordova Electric Cooperative
- Arthur Kressner; Grid Connections, LLC
- Shaun Mann; Tri-State Generation and Transmission
- Jeff Morris; Washington State House of Representatives
- Delia Patterson; American Public Power Association
- Darlene Phillips; PJM Interconnection, LLC
- Anda Ray; Electric Power Research Institute
- Wanda Reder; Grid-X Partners, LLC
- Marcos Valenzuela Ortíz; Centro Nacional de Control de Energía
- David Wade; Chattanooga Electric Power Board
- Tom Weaver; American Electric Power Company Inc.





#### **Previous Reviews**

- The '2012 Storage Report: Progress and Prospects: Recommendations for the U.S. Department of Energy,' approved 24 January, 2014, fulfilled both requirements
- The '2014 Storage Plan Assessment: Recommendations for the U.S. Department of Energy,' approved 25 September, 2014, fulfilled the second
- The '2016 Storage Plan Assessment: Recommendations for the U.S. Department of Energy,' approved 29 September, 2016, fulfilled both requirements
- The '2018 Biennial Energy Storage Review,' approved 20 June, 2019, fulfilled the second
- The '2020 Biennial Energy Storage Review,' is proposed to fulfill the second



### Scope

- The 2012 review focused on storage-related activities of OE
- The 2014 review expanded this scope to include OE, EERE, ARPA-E, and SC
  - The report examined also coordination between the Department and other Federal agencies (e.g., NSF and DOD)
  - This was in line with offices and agencies included in the Department's overall strategy
- The 2016 review maintained the same broad programmatic scope
  - Technological scope was expanded beyond electricity in/electricity out storage
  - Includes power-to-gas, thermal, and virtual storage
- The 2018 review did and 2020 review will maintain this same breadth





#### **Process**

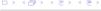
- Outside interviews: users and implementers of the Department's storage program to inform assessment and recommendations
- Interviewee groups:
  - Energy-storage industry
  - Generation industry
  - Utility industry
  - State regulators, energy officials, and legislators
  - Consumer advocates
  - Energy and environment think tanks and NGOs
  - Department and National Laboratory program managers
- DOE OE Energy Storage Peer Review 2019
- Web form and supplemental telephone interviews





#### Other Work Products

- National Distributed Energy Storage in the Electric Grid (March, 2016)
- High Penetration of Energy Storage Resources on the Electricity System (June, 2017)
- Securing the 21st-Century Grid: The Potential Role of Storage in Providing Resilience, Reliability, and Security Services (June, 2018)
- A Review of Emerging Energy Storage Technologies (June, 2018)
- DOE's Role in Assisting State-Level Implementation, Valuation, and Policy Treatment of Energy Storage (March, 2019)



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# Thank you



